AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A microbead particle system for bioassay comprising:

at least one microbead particle made of polymeric material;

a pattern encoded on at least one portion of said at least one microbead particle, said pattern physically marked into a digital data layer of said at least one microbead particle to reveal or block a reflective, photoluminescent or absorbing pattern, said digital data layer cooperating with a transducing layer of said at least one microbead particle to produce a detectable binary data signal ~~capable of being read as binary data~~ , said transducing layer being selected from the group consisting of: silver-containing films, indium-containing films, antimony-containing films and tellurium-containing films; and

a selected geometry effectively associated with said at least one microbead particle, said selected geometry capable, alone or with other artifacts, of identifying said at least one microbead particle;

wherein said microbead particle is suitable for chemical conjugation with ligands ~~and~~

~~means associated with said at least one microbead particle for enabling or enhancing chemical conjugation between said at least one microbead particle and a ligand~~.

2. (Original) The microbead particle system as defined in claim 1 wherein said polymeric material is selected from the group consisting of thermoplastics, thermosets, photocrosslinkable resins, photopolymerizable resins, and organosilicon resins.

3. (Original) The microbead particle system as defined in claim 1 wherein said pattern is encoded in at least one dimension or within said portion.

4. (Original) The microbead particle system as defined in claim 1 further comprising at least one layer of material on or within said polymeric material, said at least one layer of material including material selected from the group consisting of dielectric materials, SiO_2, TiO_2, tantalum pentoxide, aluminum silicate, titanium nitride, metals, silver, gold, copper, nickel, palladium, platinum, cobalt, rhodium, iridium, photoluminescent compounds, aluminum tris (8-hydroxyquinoline), hydroxyquinoline aluminum chelate, N-p-methodxylphenyl-N-phenyl-p-method- oxylphenyl-stryrylamine, diphenyl-p-t-butylphenyl-1,3,4-oxadiazole, 4-dicyanomethylene-2-methyl-6-(p-dimethylamino styryl)-4H-pyran, and

polymer blends containing photoluminescent polymers, poly(phenylenevinylenes), poly(fluorenes), and polythiophenes.

5. (Withdrawn) The microbead particle system as defined in claim 4 wherein said at least one layer of material is electromagnetically transducing, said at least one layer of material having a measurable response to electromagnetic excitation, said measurable response formed according to said pattern.

6. (Original) The microbead particle system as defined in claim 4 wherein said at least one layer of material includes at least one surface suitable for chemical conjugation with a ligand.

7. (Original) The microbead particle system as defined in claim 1 wherein said pattern is symmetrical.

8. (Previously Presented) The microbead particle system as defined in claim 7 wherein said pattern is capable of generating a diffractive image.

9. (Previously Presented) The microbead particle system as defined in claim 7 wherein said pattern comprises at least one unit cell, said at least one unit cell being repeated on at least part of said at least one portion, said pattern capable of generating a diffractive image.

10. (Original) The microbead particle system as defined in claim 9 wherein said pattern is capable of generating the diffractive image as long as a region of said pattern is illuminated by a beam having at least the same size as said at least one unit cell, said at least one unit cell capable of being illuminated at an angle.

11. (Previously Presented) The microbead particle system as defined in claim 7 wherein said pattern comprises a plurality of regions, said plurality of regions being capable of producing a plurality of electromagnetic responses, said plurality of electromagnetic responses generating a binary code.

12. (Previously Presented) The microbead particle system as defined in claim 11 wherein said plurality of electromagnetic responses is selected from the group consisting of reflectivity, light

absorption and photoluminescence.

13. (Previously Presented) The microbead particle system as defined in claim 7 wherein said selected geometry comprises a pre-selected surface shape and size, said selected geometry enabling seating in a receiving substrate in a manner effective for particle identification.

14. (Original) The microbead particle system as defined in claim 13 wherein said pre-selected surface shape and size is selected from the group consisting of triangles, circles, squares, crosses, diamonds, parallelograms, and semicircles, wherein said pre-selected surface shape is used in combination with a treatment selected from the group consisting of color dyes, color absorbing dyes, pigments, and dielectric coatings, said treatment creating an interferometric or holographic color pattern.

15. (Withdrawn) The microbead particle system as defined in claim 1 wherein said at least one portion is a transducing layer or a digital data layer, said transducing layer or digital data layer further comprising:

a protective layer laid on top of said transducing layer or said digital data layer;

wherein said digital data layer, either cooperating with said transducing layer or acting as said transducing layer, produces a detectable response signal when exposed to energy, wherein said transducing layer or said digital data layer is made of material selected from the group consisting of silver, indium, antimony, and tellurium, wherein said transducing layer or said digital data layer is coated with photo-sensitive dye that is burned with a laser according to a pre-selected pattern of 1 's and 0's.

16. (Previously Presented) The microbead particle system as defined in claim 7 wherein said pattern represents ridges and troughs corresponding to pre-selected constructive and destructive interference patterns, a relationship between said ridges and troughs being a function of refractive index of said polymeric material, refractive index of a medium through which the depth of said pattern is measured, and the wavelength of light impinging on said pattern.

17. (Original) The microbead particle system as defined in claim 1 wherein said at least one portion further comprises:

a first embossed polymeric material having a first inner surface opposing a first patterned

surface; and

a second embossed polymeric material having a second inner surface opposing a second patterned surface,

wherein said first inner surface forms a bond with said second inner surface.

18. (Previously Presented) The microbead particle system as defined in claim 1 further comprising:

means for marking said at least one microbead particle after binding with an analyte, said at least one microbead particle being identified by the emission of dyes or luminescent molecules associated with the analyte.

19. (Withdrawn) The microbead particle system as defined in claim 1 wherein said at least one portion is selected from a group consisting of a metallic layer and a dielectric stack

Claims 20-28 (Canceled)

29. (Currently Amended) A microbead being formed according to a ~~the~~ process comprising ~~including~~ the steps of:

creating a patterned master substrate having at least one pattern and at least one shape, the at least one pattern having at least one level of pattern depth, the at least one shape enabling identification and proper seating in a receiving substrate, the at least one pattern being physically marked into a digital data layer of said ~~the~~ microbead ~~particle~~ to reveal or block a reflective, photoluminescent or absorbing pattern, the digital data layer cooperating with a transducing layer of said ~~at least one~~ microbead ~~particle~~ to produce a detectable binary data signal ~~capable of being read as binary data~~ , said transducing layer being selected from the group consisting of: silver-containing films, indium-containing films, antimony-containing films and tellurium-containing films;

applying polymeric material to the patterned master substrate to form at least one patterned polymeric microbead or at least one patterned microbead precursor;

partitioning the polymeric material to form the ~~at least one polymeric~~ microbead; and

releasing the polymeric material from the patterned master substrate.

Claims 30-33 (Canceled)